REMOVAL & INSTALLATION

CLUTCH HUB REMOVAL

1. Remove clutch retaining ring or nut. Use a spanner wrench to prevent the hub plate from turning.

2. Attach the tool to the end plate by threading the outer nut of the tool into the center hole of the clutch end plate.

3. Tighten the inner tool arbor against the end of the compressor shaft to lift the plate.

Tech Tip: Proper air gap between the clutch pulley and hub armature is critical to compressor overall performance. Failure to maintain the proper spacing, as indicated in the mfgrs. specifications can lead to problems such as clutch burning or slippage.

CLUTCH HUB INSTALLATION

1. Position the shaft key in place.

2. Slide the clutch hub onto the shaft of the compressor. Be careful not to damage the components by using excess force.

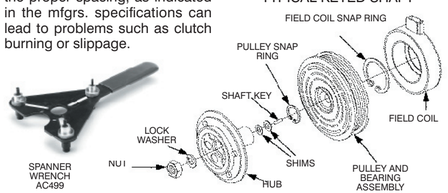
3. Thread the inner part of the tool onto the shaft. Tighten the outer nut of the tool to push the shaft key in.

4. Set the air gap. Add or remove shims to obtain the mfg. specifications. Always set at the min. number and measure at multiple points around the circumference.

5. Reinstall the retaining ring or nut.

6. Check oil level and rotate the hub with the nose of the compressor down to help lubricate. You can

TYPICAL KEYED SHAFT



TROUBLESHOOTING

check for ease of rotation.

TROUBLESHOOTING COMPRESSORS

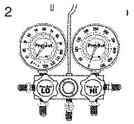
Checking compressor ratios is an excellent way to check system performance and possible failures. Run the vehicle at 1500 RPM and record both gauge readings then add 15PSI to your reading.

Example:

35PSI plus 15=50(low)

235PSI plus 15=250(high)

2



R-12 acceptable ratios are between 5 to 1and 6 to 1

R-134a acceptable ratios are between 6 to 1 and 7 to 1

If a systems exceeds these ratios the compressor may fail to high internal pressure on the pistons and swash plates.

Possible causes of high ratios are refrigerant overcharges and air in the system. Recover /recharge, vacuum, and identify source of excess air. (Use refrigerant identifier to check equipment, tanks, and system)

CLUTCH PROBLEM AREAS
BURNED CLUTCH

1. Hub/armature and rotor/pulley drive faces have oil or grease on them.

a. Look for shaft seal leak and replace clutch

b. Compressor leaking through the bolt. Repair leak source.

2. Check for missing or improperly installed snap ring. Repair or replace the clutch.

3. Field coil snap ring is wrong size. Measure thickness and refer to parts manual for correct size. Repair or replace clutch if damaged. Always check anti-rotation pin damage. Retaining ring should be facing away from the compressor, fully seated in groove, lug of ring should not be over the anti-rotation pin, and field ring tight against the compressor.

4. Check to ensure clutch components are matched correctly. The straight coil to straight rotor/ pulley and stepped coil to stepped rotor/pulley. Repair or replace if they don't match. REPLACE IN PAIRS.

5. Look for high pressures. Remember too much oil will cause slugging and low oil causes binding. Make sure you don't have

TROUBLESHOOTING

an airflow restriction.

CLUTCH SLIPPING

1. Low torque problem. Cycle on/off between 2500- 3000 RPM for 50 cycles to burnish the hub and rotor.

2. Low voltage at the field coil. Check for wiring shorts, poor connections, and defective relays.

3. Compressor is seized or tight. Check torque specs. Repair or replace.

4. High system pressures. Check compressor oil levels. Excess oil can slug compressor. Low oil will cause binding. Condenser restrictions from blockage or improper fan operation will reduce air flow and raise discharge pressures.

5. High heat coming from clutch bearing will produce loose grease and then bearing failure.

NOISY CLUTCH

1. Check belt size, tension, and alignment.

2. Rotor dragging. Air gap is too small. Reset and shim if necessary.

3. Wrong coil snap ring and installed wrong. Repair or replace.

4. Field assembly installed incorrect. Make sure it is bottomed completely on shoulder. Pilot diameter is worn undersized. The field shell pilot is worn oversize. Replace compressor and or/ assembly. The bearing is damaged. Replace clutch.

CLUTCH DOESN'T ENGAGE

1. The air gap is excessive. Reset and remove shims.

2. Voltage at coil isn't 10.8. Poor connection, shorts, relays, or charging system.

3. Resistance problem at coil. Shorted or open coil so replace and diagnose electrical problems

CLUTCH FAILS TO DISENGAGE

1. Clearance between the hub and rotor is too close. Shim to increase.

2. Rotor snap ring missing or installed wrong. Repair or replace.

3. The air gap is too small. Reset and add shims.

WARRANTY & REPAIR POLICY

MAC guarantees that all tools are free of manufacturing and material defects for one year. If a tool should fail during the guarantee period it will be repaired or replaced (at our option) at no charge. This guarantee does not apply to tools that have been altered, misused, or returned solely in need of field service maintenance. This repair policy does not include tools that are determined to be beyond economical repair. A tool being returned for warranty repair must be accompanied by an original bill of sale and customer contact information.

WE ENCOURAGE PROFESSIONALISM

ASE CERTIFIED

THROUGH IDENTIFICATION

1-800-MAC TOOLS
WWW.MACTOOLS.COM

#73-007 Rev.C

AIR CONDITIONING COMPRESSOR/CLUTCH SERVICE MANUAL

AC10868A - CLUTCH HUB TOOL KIT

(AC499 SPANNER WRENCH - OP

CONTENTS

This manual contains compressor and clutch service information to use with your tool kit. The information includes clutch air gaps, shaft nut torque, oil viscosity, and common problems to assist you in the compressor/clutch repair. Also the (MACS) Mobile Air Conditioning Society publishes a comprehensive air conditioning service manual that will supply wiring diagrams, component locations, trouble codes, serpentine belt specs, and additional service information.

Order A/C Reference Manual #44151A

Phone 215-631-7020 or Fax 215-631-7017
Website: www.macs.org

First select the model of compressor/clutch you are repairing and the required tools. Then reference the specific clutch problem for corrective action. Additional tools maybe needed such as a manifold gauge set, refrigerant oil injector, feeler gauge, and torque wrench.

Always wear safety glasses and protective gloves.

This manual is not designed to replace factory service publications and MAC assumes no liability for use of such information contained in it or any damage incurred through its' use by the service technicians or repair facilities.
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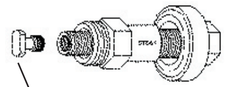
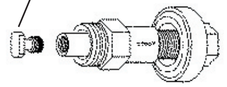
COMPRESSOR CLUTCH TOOLS

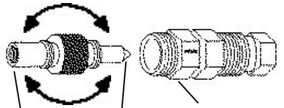


CT861 Re-Order AC10861MA
Delphi/Harrison/A6/R4
SAE Remover/Installer
CS41-631 Bearing

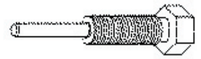
Use to remove clutch hub



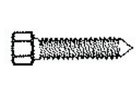
CT867 Re-Order AC41067MA
Delphi/Harrison
DA6/V5 HR6/R4
Metric Remover/Installer
CS41-631 Bearing



CT884 Re-Order AC884
ChryslerC171/Ford FS6/
Hitachi MJ/Tecumseh
HR980/Nippondenso
6P/10P
Remover/Installer

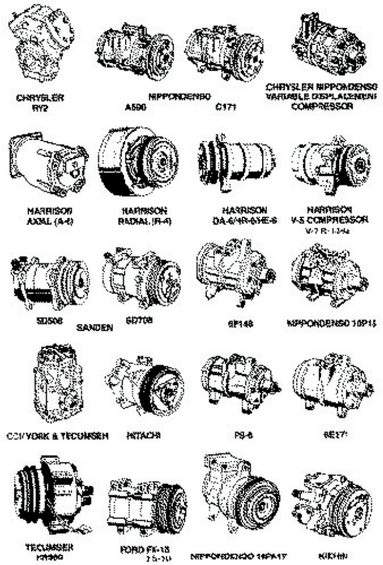


CSCT206
Zexel (Diesel Kiki)
Mitsubishi
Clutch End Plate Remover
Use with CT305



CSCT305
Sanden SD5 & 7
Clutch End Plate Remover

MODEL IDENTIFICATION



Manufacturers have changed their part numbers indicating upgrades to R-134a. They use HNBR/neoprene materials, larger bearings, improved oil passages, and modifications for piston/swash plate designs. A few models will have to be replaced during retrofit.

R-134a COMPRESSOR SPECIFICATIONS

Vehicle Mfgr.	Compressor Mfg.	Model	TYPE/R 134a Oil
General Motors	Delphi/Harrsion	A-6 & R-4 SAE	PISTON/PAG 150
General Motors	Delphi/Harrsion	V-5 & V-7	PISTON/PAG 150
General Motors	Delphi/Harrsion	R-4/DA6 HR6/HR6HE	PISTON/PAG 150
Ford/Lincoln	Ford	FS-6/ FS-10/FX-15	PISTON/PAG 68
Ford/Lincoln	Nippondenso	6P148/10P15/6E171/17	PISTON/PAG 46
Chrysler/Dodge	Nippondenso	A590/C171/6C17	PISTON/PAG 46
Chrysler/Dodge	Sanden	TRS90/105	SCROLL/PAG 46
Chrysler/Dodge	Sanden	SDB708/SD709/7H15	WOBBLE PLATE/PAG 100
Acura/Honda	Nippondenso	6P127/10P13/15	PISTON/PAG 46
Audi/VW	Nippondenso	10P17	PISTON/PAG 46
Audi	Zexel(Diesel Kiki)	DCW	WOBBLE PLATE/PAG 46
Audi/VW	Sanden	SD508/510/709	WOBBLE PLATE/PAG 100
Audi	Delphi/Harrsion	A-6	PISTON/PAG 150
BMW	Nippondenso	10P15	PISTON/PAG 46
Honda	Sanden	TR70	SCROLL/PAG 46
Hyundai	Zexel(Diesel Kiki)	DKS15-BH	SWASH PLATE/PAG 46
Hyundai	Sanden	SD7	WOBBLE PLATE/PAG 100
Hyundai	Ford	FX15	PISTON/PAG 68
Isuzu	Delphi/Harrsion	R-4	PISTON/PAG 150
Isuzu	Zexel(Diesel Kiki)	DKS 13/14/17	SWASH PLATE/PAG 46
Jaguar	Sanden	SD5 & 7 Series	WOBBLE PLATE/PAG 100
Jeep/Chrysler	Sanden	SD5 & 7 Series	WOBBLE PLATE/PAG 100
Mazda	Nippondenso	10P13	PISTON/PAG 46
Mazda	Ford	FS-10	PISTON/PAG 68
Mazda	Sanden	SD5 & SD7	WOBBLE PLATE/PAG 100
Mercedes Benz	Delphi/Harrsion	A-6 & R-4	PISTON/PAG 150
Mercedes Benz	Nippondenso	10P15/17	PISTON/PAG 46
Mitsubishi	Mitsubishi	FX105	SCROLL/PAG 56
Mitsubishi	Nippondenso	10P15	PISTON/PAG 46
Nissan/Infinity	Zexel(Diesel Kiki)	DKV-14C	ROTARY VANE/PAG 46
Nissan/Infinity	Zexel(Diesel Kiki)	DKS-16H	SWASH PLATE/PAG 46
Nissan	Ford	FS-10	SWASH PLATE/PAG 68
Nissan	Hitachi	MJS170	ROTARY VANE/PAG 46
Porsche	Nippondenso	10P	PISTON/PAG 46
Porsche	Sanden	SD5	PISTON/PAG 100
Saab	*Sanden,Seiko Seiki	SD5/7Series,SS170	WOBBLE PLATE/PAG 100
Saturn	Zexel(Diesel Kiki)	DKV	ROTARY VANE/PAG 46
Suburu	Zexel(Diesel Kiki)	*92 Model/93	*PAG 46/PAG 100
Suzuki	Nippondenso	10P8	PISTON/PAG 46
Toyota/Lexus	Nippondenso	10P13/15/17	PISTON/PAG 46
MB/Porsche/VW	York	206,209,210	PISTON PAG/ESTER
Volvo	Zexel(Diesel Kiki)	DKS-15	SWASH PLATE/PAG 46
Volvo	Sanden	SD508,510,709	WOBBLE PLATE/PAG 100
Volvo/Jaguar	Delphi/Harrsion	A-6, R-4	PISTON/PAG 150

* ESTER FOR RETROFIT USE SAME VISCOSITY * EXCEPT FX-15

SHAFT NUT TORQUE AND HUB AIR GAPS

Adjust	Shaft Nut Torque	Hub Air Gap	Tool P/N
Press Fit	15 ft./lb.	.020-.040	AC10861MA
Press Fit	8-16 ft./lb.	.015-.025	AC41067MA
Press Fit	8-12 ft./lb.	.020-.030	AC41067MA
Shims	12 ft./lb.	.016-.028	AC884
Shims	8-12 ft./lb.	.016-.032	*AC884
Shims	12 ft./lb.	.016-.032	AC884
Shim Adjust	25-30 ft./lb.	.016-.031	CT305
Shim Adjust	20-25 ft./lb.	.016-.031	CT305
Shims	8-12 ft./lb.	.016-.032	AC884
Shims	8-12 ft./lb.	.016-.032	AC884
Shims	16 ft./lb.	.010-.020	CT305/206
Shim Adjust	20-25 ft./lb.	.016-.031	CT305
Press Fit	15 ft./lb.	.020-.040	AC10861MA
Shims	8-12 ft./lb.	.016-.032	AC884
Shim Adjust	20-25 ft./lb.	.014-.026	N/A
Shims	16 ft./lb.	.010-.020	CT305/206
Shim Adjust	20-25 ft./lb.	.016-.031	CT305
Shims	8-10 ft./lb.	.016-.028	N/A
Press Fit	15 ft./lb.	.020-.040	AC10861MA
Shims	16 ft./lb.	.010-.020	CT305/206
Shim Adjust	20-25 ft./lb.	.016-.032	CT305
Shim Adjust Press Fit	15 ft./lb.	.016-.032	AC10861MA
Shims	8-12 ft./lb.	.016-.032	AC884
Shims	12 ft./lb.	.016-.028	CT305/206
Shim Adjust	20-25 ft./lb.	.016-.031	CT305
Shims	20-25 ft./lb.	.020-.040	CT305
Shims	8-12 ft./lb.	.016-.032	AC884
Shims	10 ft./lb.	.015-.023	CT206
Shims	8-12 ft./lb.	.016-.032	AC884
Shims	16 ft./lb.	.010-.020	CT305/206
Shims	16 ft./lb.	.010-.020	CT305/206
Shims	12 ft./lb.	.016-.028	AC884
Shims	14-15 ft./lb.	.020-.031	AC884
Shims	8-12 ft./lb.	.016-.028	AC884
Shim Adjust	20-25 ft./lb.	.016-.031	CT305
SHIM,Shim Adjust	20-25 ft./lb.	.016-.031/NA	CT305
Shims	16 ft./lb.	.010-.020	CT305/206
Shims	25-30 ft./lb.	.010-.020	CT305/206
Shims	8-12 ft./lb.	.016-.032	AC884
Shims	8-12 ft./lb.	.016-.032	AC884
No Adjust	20-25 ft./lb.	N/A	N/A
Shims	16 ft./lb.	.010-.020	CT305/206
Shim Adjust	20-25 ft./lb.	.016-.031	CT305
Press Fit	15 ft./lb.	.020-.040	AC10861MA